

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization International Bureau



(43) International Publication Date
6 January 2005 (06.01.2005)

PCT

(10) International Publication Number
WO 2005/001966 A2

(51) International Patent Classification⁷: H01M 4/88, 8/10

(21) International Application Number:

PCT/EP2004/006849

(22) International Filing Date: 24 June 2004 (24.06.2004)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

03 01 4405.9 27 June 2003 (27.06.2003) EP

(71) Applicant (for all designated States except US): UMICORE AG & CO. KG [DE/DE]; Rodenbacher Chaussee 4, 63457 Hanau-Wolfgang (DE).

(72) Inventors; and

(75) Inventors/Applicants (for US only): HOHENTHANNER, Claus-Rupert [DE/DE]; Grünaustrasse 11, 63457 Hanau (DE). KÜHNHOLD, Helke [DE/DE]; In den Niederwiesen 4, 63486 Bruchköbel (DE). BARTH, Bernhardt [DE/DE]; Graf-v-Stauffenberg-Strasse 10,

33615 Bielefeld (DE). SEIPEL, Peter [DE/DE]; Am Dachsberg 3a, 63755 Alzenau (DE).

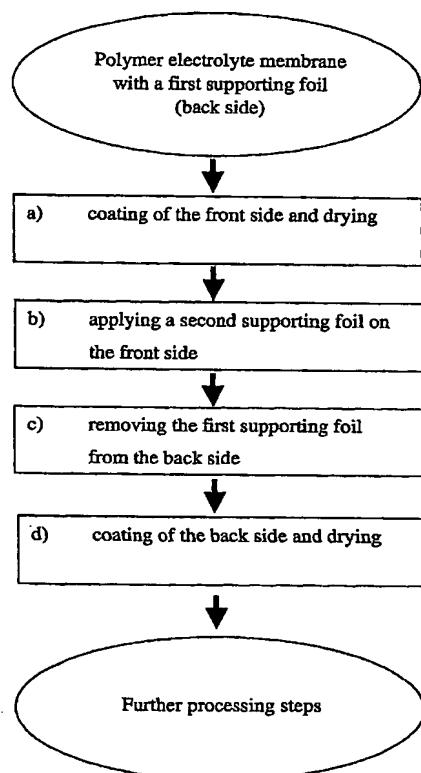
(74) Agent: VOSSIUS & PARTNER; Siebertsrasse 4, 81675 München (DE).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,

[Continued on next page]

(54) Title: PROCESS FOR MANUFACTURING A CATALYST-COATED POLYMER ELECTROLYTE MEMBRANE



(57) Abstract: The present invention relates to a process for manufacture of a catalyst-coated polymer electrolyte membrane (CCM) for electrochemical devices. The process is characterized in that a polymer electrolyte membrane is used which is supported on its backside to a first supporting foil. After coating of the front side, a second supporting foil is applied to the front side, the first supporting foil is removed and subsequently the second catalyst layer is applied to the back side. In this process, the membrane is in contact with at least one supporting foil during all processing steps. Smooth, wrinkle-free catalyst-coated membranes are obtained in a continuous process with high production speed. The 3-layer catalyst-coated membranes (CCMs) are used in electrochemical devices, such as PEM fuel cells, direct methanol fuel cells (DMFC), sensors or electrolyzers.



FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Published:

- *without international search report and to be republished upon receipt of that report*

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization International Bureau



(43) International Publication Date
6 January 2005 (06.01.2005)

PCT

(10) International Publication Number
WO 2005/001966 A3

(51) International Patent Classification⁷: H01M 4/88, 8/10

(21) International Application Number:

PCT/EP2004/006849

(22) International Filing Date: 24 June 2004 (24.06.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
03 01 4405.9 27 June 2003 (27.06.2003) EP

(71) Applicant (for all designated States except US): UMICORE AG & CO. KG [DE/DE]; Rodenbacher Chaussee 4, 63457 Hanau-Wolfgang (DE).

(72) Inventors; and

(75) Inventors/Applicants (for US only): HOHENTHANNER, Claus-Rupert [DE/DE]; Grünaustrasse 11, 63457 Hanau (DE). KÜHNHOLD, Heike [DE/DE]; In den Niederwiesen 4, 63486 Bruchköbel (DE). BARTH, Bernhardt [DE/DE]; Graf-v-Stauffenberg-Strasse 10, 33615 Bielefeld (DE). SEIPEL, Peter [DE/DE]; Am Dachsberg 3a, 63755 Alzenau (DE).

(74) Agent: VOSSIUS & PARTNER, Siebertstrasse 4, 81675 München (DE).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

(88) Date of publication of the international search report:
17 March 2005

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

WO 2005/001966 A3

(54) Title: PROCESS FOR MANUFACTURING A CATALYST-COATED POLYMER ELECTROLYTE MEMBRANE

(57) Abstract: The present invention relates to a process for manufacture of a catalyst-coated polymer electrolyte membrane (CCM) for electrochemical devices. The process is characterized in that a polymer electrolyte membrane is used which is supported on its backside to a first supporting foil. After coating of the front side, a second supporting foil is applied to the front side, the first supporting foil is removed and subsequently the second catalyst layer is applied to the back side. In this process, the membrane is in contact with at least one supporting foil during all processing steps. Smooth, wrinkle-free catalyst-coated membranes are obtained in a continuous process with high production speed. The 3-layer catalyst-coated membranes (CCMs) are used in electrochemical devices, such as PEM fuel cells, direct methanol fuel cells (DMFC), sensors or electrolyzers.